

Delete items are struck out and new items are underlined.

**Built-up Bituminous Roofing  
TECHNICAL GUIDE**

# TG 07510

## 1. COORDINATION ISSUES:

- 1.1 Coordinate installation of metal edging, roof accessories, gutters, counterflashing, etc. with SHEET METAL section. Coordinate roofing operations with appurtenant work such as sheet metal work that roof surfacing operations once started shall be continuous to completion.
- 1.2 In the SHEET METAL section require a warranty on sheet metal terminations to the built-up roofing similar to the requirements ~~of the requirements~~ of this ~~Technical Guide Section~~ TG 07510 to produce a total installation guaranty on the roof installation.
- 1.3 Mechanical, Plumbing and Electrical Penetrations: Coordinate design of vent pipe flashing and roof drains with plumbing design section. Coordinate mechanical penetrations. Coordinate electrical penetrations.
- 1.4 Coordinate installation of wood strip nailers related to roofing with “Cast-in-Place Concrete”, “Rough Carpentry” or “Miscellaneous Carpentry” sections.
- 1.5 Refer to TG 07550 for insulation selection.

## 2. DESIGN ISSUES:

- 2.1 **General:** In lieu of the built-up roofing system addressed in this Technical Guide consider a modified bituminous roofing system which is the DAGS preferred asphalt roofing system or single ply elastomeric sheet roofing.

### 2.2 Roof Slopes and Drainage:

- 2.2.1 **New Roofs:** Roof structure and insulation slope must adhere to the minimum and maximum roof slopes permitted by DAGS, the roofing membrane manufacturer or the NRCA. The DAGS minimum slope is ½ inch per foot.

### 2.2.2 Reroofing of Existing Roofs

- 2.2.2.1 Asphalt roofing cannot tolerate continuous submersion in water without reemulsification. Identification and correction of water points of water retainage must be addressed in reroofing projects. Source of ponding and possible leakage may be structural (sagging or improperly sloped joists, beams or decking), damaged or wet insulation, or damaged, inadequate or clogged roof drains or scuppers. Before selection of reroofing system perform the following field investigations if rain or water test shows points of water collection:

Structural Investigation: If possible view underside of roof. Ponding at midspans may indicate a structural problem.

Damaged or wet insulation: Perform test cuts (small roofs) or obtain a commercially available non -destructive subsurface moisture survey (large roofs) to determine the extent of damaged insulation. Reroofing design must include removal of damaged or wet insulation.

Damaged or Clogged Roof Drains and Scuppers: If possible view roof drains from underside to confirm watertightness and condition of structural attachment to slab or decking. Clean drain sufficiently to confirm flashing condition, utility and free-draining ability of the roof drain.

### 2.3 Mechanical Attachments:

- 2.3.1 **Problem:** Mechanical fastening of roof insulation to metal decking creates an unsightly appearance where the underside of the deck is exposed such as in Lanais and covered walkways. Protruding fasteners make the surface difficult to repaint and maintain.
- 2.3.2 **Recommendation:** Where the underside of the metal deck will be exposed to view in either new or renovation/ reroofing projects, specify the securement of roof insulation using roof insulation adhesives.

### 2.4 Hot Mopping:

- 2.4.1 **Environmental Concerns:** If hot asphalt is used, provide contractor’s restrictions to prevent asphalt fumes from becoming a hazard. For example, consider shutting down all HVAC equipment and close all points of ingress to minimize potential entry of emissions into the building.

## 3. DRAWING NOTES:

### 3.1 Gravel Stops:

3.1.1 Show gravel stop details on plans. If roof drains over edging, call for "0" lips. Use 3/8 inch height of lip for gravel surfaced roofing.

3.1.2 Provide closely spaced substantial anchorage of the face flange in high wind areas or areas exposed to high wind conditions. Continuous sheet metal clips with closely spaced fasteners or direct nailing of the face flange which closely spaced fasteners having neoprene washers are acceptable. Verify with your Project Coordinator if your project is in this category.

### 3.2 Sheet Metal Housings:

3.2.1 Conduits, pipes, etc., (other than vent pipes) which penetrate the roof shall be routed laterally through sheet metal housings. The housings shall cover the openings in the roof and have horizontal flanges at least 4 inches wide. The assemblies shall be placed and counterflashed.

### 3.3 Insulation:

3.3.1 Specify thickness if it is critical to detailing. Add Notes on appropriate drawing or details: "Insulation thickness assumed for this detail is \_\_\_\_ inches. Required changes shall be coordinated if actual thickness is other than as shown."

3.3.2 Be sure that insulation specified on metal decks will span flute-to-flute clear span.

### 3.4 Correction:

3.4.1 For re-roofing projects, show location of existing bird-baths or ponding areas on the roof plan. Address correction.

### 3.5 Flashing at Penetrations:

3.5.1 Use 3 plies of base flashing for all roof penetrations. If acceptable under the provisions of the roofing manufacturer's warranty, 2 plies of torch-applied modified bitumen membrane may be used in lieu of the 3 plies.

## 4. STANDARD DRAWINGS:

4.1 As of 03/2003, DAGS Standard Roofing Details will no longer be maintained.

4.2 Plates from the NRCA Roofing and Waterproofing Manual may be reproduced or redrawn onto the Project drawing sheets to serve as drawing details. Choose only plates for the roof membrane termination and penetration conditions applicable to the project.

## 5. SPECIFICATION NOTES:

5.1 **Specification Paragraphs:** As of 03/2003, a complete Guide Specification for 07510 is no longer being maintained by DAGS. Utilize the following specification paragraphs and information as appropriate in the development of the Project Specifications.

## 6. GUIDE SPECIFICATION:

### 6.1 Quality Assurance: (Part 1)

6.1.1 **Installer Qualifications:** Insulation adhesive applicator, if any, and roof membrane applicator shall be approved, authorized or licensed by the roofing system manufacturer to install the respective manufacturer's product.

6.1.2 **Source Control:** All materials except the insulation, insulation adhesive, emulsions, coatings and the venting medium when it is under insulation and is therefore not an integral part of the roofing membrane shall be as labeled or approved by one manufacturer.

**SPECIFIER'S NOTE: Retain paragraph 6.2 only when the size or complexity of the roofing and flashing work warrants a Pre-installation Meeting. Otherwise delete paragraph 6.2 entirely.**

### 6.2 Pre-installation Meeting: (Part 1)

6.2.1 The General Contractor, the authorized roofing and roofing adhesive manufacturers' representatives or their independent roofing inspectors shall attend a pre-installation meeting. Include other related trades, such as the sheet metal contractor, as applicable. Notify participants at least five days prior to meeting. Intent of meeting is to review the preparation and installation requirements for the roofing system and to coordinate and schedule the required work.

### 6.3 Roofing System Manufacturer's Project Participation: (Part 1)

- 6.3.1** The General Contractor, Roofing Installer and Roofing System Manufacturer Representative or their independent roofing inspector shall inspect the roof surfaces at the following times:
1. Prior to the start of the roofing installation,
  2. At the start of the roofing application,
  3. At least once during the roofing application, unless the Roofing System Manufacturer requires additional inspections for warranty provisions.
- 6.3.2** Change the number of inspections to suit magnitude and complexity of the project. A minimum of one inspection is required during the roofing application for roofs not larger than 7,000 square feet with no unusual penetrations and with no rooftop equipment mounts.

#### **6.4 Submittals: (Part 1)**

- 6.4.1 Shop Drawings:** Should the Manufacturer's warranty requirements necessitate different drawing and details exceeding the requirements of those shown or specified, provide shop drawings and field adjustments.
- 6.4.2 Certifications:** Require the following submittals for review prior to ordering of materials:
- 6.4.2.1** a signed certificate from the proposed roofing manufacturer showing that the roofer is a trained and authorized applicator of the assemblies,
- 6.4.2.2** a signed certificate from the proposed roofing system manufacturer naming their representative and their independent roofing inspector showing that the individual is authorized to act on and make commitments in their behalf,
- 6.4.2.3** where required, Factory Mutual or UL approval for the proposed insulation/roofing systems, and,
- 6.4.2.4** if insulation is applied using an adhesive onto metal decking, a signed certificate from the adhesive manufacturer showing that the roofer is a trained and authorized applicator of the assembly. The certificate shall also reference the project's scope, type of deck, insulation and adhesive materials being used.
- 6.4.3 Inspection Reports:** Detailed roofing inspection reports by the Manufacturer's Representative or their independent inspector for each required inspection.
- 6.4.4 Warranty:** Provide project warranty and manufacturer's special warranty on approved forms.
- 6.4.5 Information Card:** For each roof project, furnish a typewritten information card for facility records and a card laminated in plastic, attached to the underside of the roof hatch, or as directed by the Contracting Officer. Cards shall be 8-1/2 inches x 11 inches. Information card shall identify facility name and/or facility designation (letter or number), contract number, type of roof system installed, including deck type, type of membrane, number of plies, method of application, manufacturer, manufacturer's representative contact information, insulation and cover board system and thickness; date of completion; installer's warranty expiration date; installing contractor and contact information; membrane manufacture's material warranty expiration date; warranty reference number, and warranty contact information. See Roofing Information Card on next page.

# ROOFING INFORMATION CARD

## FACILITY

Building Name \_\_\_\_\_ Bldg. desig/No. \_\_\_\_\_

DAGS Job. No. \_\_\_\_\_

## ROOF

Type of Roof System \_\_\_\_\_ Type of Deck \_\_\_\_\_

## MEMBRANE

Type of Membrane \_\_\_\_\_ No. of Plies \_\_\_\_\_

## APPLICATON

Method of Application \_\_\_\_\_ (nailed, heat applied, self-adhered, etc.)

## INSULATION

Type of Insulation \_\_\_\_\_ Cover Board \_\_\_\_\_

Thickness \_\_\_\_\_ Thickness \_\_\_\_\_

## INSTALLER (Roofing Contractor)

Company \_\_\_\_\_ Contact person \_\_\_\_\_

Contact No. \_\_\_\_\_

## MANUFACTURER

Company \_\_\_\_\_ Representative \_\_\_\_\_

Contact No. \_\_\_\_\_

## COMPLETION DATE \_\_\_\_\_

## DATE INSTALLER'S WARRANTY EXPIRES \_\_\_\_\_

## DATE MANUFACTURER'S WARRANTY EXPIRES \_\_\_\_\_

Warranty Reference No. \_\_\_\_\_ Warranty Contact person \_\_\_\_\_

Contact No. \_\_\_\_\_

## 6.5 Minimum Warranty Requirements: (Part 1)

~~6.5.1~~ The warranty provisions and number of years for the warranty required by this article shall take precedence over the standard provisions in the GENERAL CONDITIONS.

~~6.5.2~~ **Special Manufacturer's Warranty: Roofing Installer and Manufacturer(s), bonded warranty without monetary limitation, in which roof installer and manufacturer(s) agrees to repair or replace components of roofing system that fail in materials or workmanship within the specified warranty period. Failure includes roof leaks, and materials and adhesion failure due to wind conditions.**

~~6.5.2.1~~ **Special Manufacturer's wWarranty includes roofing membranes and base flashings, [roofing membrane accessories] [roof insulation] [fasteners] [cover boards] [substrate boards] [vapor retarders] [roof pavers] [walkway products] and other components of the roofing system.**

Warranty Period: Ten years from the Project Acceptance Date.

Wind Conditions: Warranty shall cover ~~peak~~ basic wind speeds up to 80 MPH Exposure , and Importance Factor as defined by the local Building Code in effect for the applicable building heights.

Warranty shall state the Manufacturer's acceptance that the roof was installed in accordance with the contract requirements and that the State's personnel were properly instructed in the maintenance procedures.

In the event of a failure State, Contractor, Roofing Installer and Manufacturer shall mutually agree and determine roof system failures and remedies.<sup>22</sup>

~~6.5.2.2~~ **Special Project Warranty: Submit Contractor's bonded warranty covering work of this section , including all components of roof system such as roofing membrane, base flashing, roofing membrane accessories, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period and conditions:**

Warranty Period: ~~Three~~ Two years from the Project Acceptance Date.

Warranty shall cover repairs or replacement of damages to the building and its finishes due to leaks.<sup>22</sup>

~~6.5.2.3~~ **Warranty Roof Inspections: Conduct a yearly inspection with the State representative just prior to the first, ~~third, fifth and second tenth~~ year anniversary of the Project Acceptance Date. The purpose of the inspections ~~are is to identification~~ identify and correct deficiencies in all components of the roofing and flashing system.**

## 6.6 Materials (Part 2)

### 6.6.1 Built-up Roofing Assemblies

~~6.6.1.1~~ In accordance with the Uniform Building Code, the roof covering assembly shall have a fire classification rating of either Class A or Class B when tested in accordance with U.B.C. Standard ~~32-7~~ 15-2 or as otherwise tested and rated as either Class A or B by a qualified testing laboratory (Underwriters Laboratories (UL), Warnock Hersey, Factory Mutual (FM) or approved equal).

~~6.6.1.2~~ **Roofing membrane system: At least three solid layers of asphalt contained between the cap sheet and the roof deck, base sheet or insulation, as the case may be. Asphalt above the cap sheet, or below the insulation where such is used, shall not count as one of the required layers. Recommended minimum standards for system components:**

Base sheet: ASTM D4601-~~98~~ Standard Specification for Asphalt Coated Glass fiber Base Sheet Used in Roofing.

Felts: ASTM D2178-~~97a~~ Standard Specification for Asphalt Glass Felt Used in roofing and Waterproofing.

Cap Sheet: ASTM D6163-~~00~~ Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.

~~6.6.2~~ **Roof and Base Flashings: Either hot-mopped asphalt, 2 roofing plies and a mineral- surfaced cap sheet (granule-side up) or 1 or 2 layers of a modified bitumen base flashing, installed in accordance with plan details. Each layer of modified bitumen flashing shall be torched-on (heat-welded) onto the substrate in accordance with the manufacturer's instructions. Secure flashings to the vertical surfaces using appropriate type fasteners through washers or termination bars at 8 inches on center along flashing top edge.**

~~6.6.3~~ **Insulation: Because of Loss of thermal resistance over time, use the following specification for polyisocyanurate insulation specify faced polyisocyanurate insulation Boards complying with ASTM C 1289 (polyisocyanurate only, polyurethane not permitted). Insulation shall have an in-service R-value of**

5.6  $\frac{QF}{x \text{ ft}^2 \times \text{hr}}$  per inch thickness.

## BTU

Insulation containing chlorofluorocarbon (CFC) is not permitted.

**6.6.4 Insulation Adhesive:** Roof insulation adhesive used to secure insulation to metal deck substrates, insulation to insulation, and insulation to facing boards shall be asbestos-free, solvent-free, waterproof (non-emulsifying), single component polyurethane type, compatible with the insulation and substrate as recommended by the adhesive and roof insulation manufacturer, specially designed for adhering insulation boards to the specified substrate (metal deck, insulation or facing boards) and conforming to the wind uplift and fire rating requirements of Factory Mutual (FM 1-90).

### 6.7 Execution: Reroofing- Minimum Preparation Requirements (Part 3)

**6.7.1 Existing Roof Drains:** Indicate work on drawings and require contractor to:

- 6.7.1.1 clean the existing locking ring before tightly bolting it to the drain housing to ensure a watertight system,
- 6.7.1.2 replace all broken or missing locking rings, bolts and strainers,
- 6.7.1.3 install roofing membrane and lead flashing as indicated on the plans, and
- 6.7.1.4 clean all drainage channels through locking rings thoroughly after reroofing to ensure unimpeded flow of water into the drain.

### 6.7.2 Metal Counter-Flashing at Curbs and Parapets:

- 6.7.2.1 Remove existing sheet metal work as necessary to allow for new sheet metal work.
- 6.7.2.2 Existing reglet to remain: Completely remove existing sealant prior to installation of new work. Fill reglet as required in accordance with the roofing manufacturer's instructions.
- 6.7.2.3 Existing sheet metal work which is called to be re-used in the new work shall be carefully removed and properly stored.
- 6.7.2.4 Remove existing cant strips and replace with new.

### 6.7.3 Insulation Adhesive Installation

6.7.3.1 Where the underside of the metal deck will be exposed to view in the final construction, either perlite insulation or glass-faced polyisocyanurate insulation shall be used and adhered to the metal deck using insulation adhesive as described under Subsection ~~2.01-K~~ 6.6.4. The units of insulation shall be installed in strict accordance with the adhesive and insulation manufacturer's instructions and recommendations and shall conform to the requirements of Underwriters Laboratories (UL 1897) or Factory Mutual Class 1, I-90 installation."

### 6.7.4 Membrane Application

6.7.4.1 In high wind areas and open areas subject to high wind conditions, require nailing of insulation in the number and pattern similar to that required for an FM approved I-90 installation along with additional nailing of the base sheet in the outer 4 feet of the building perimeter. Verify with your project coordinator if your project is in this category.

END OF SECTION

**UPDATED INFORMATION IS UNDERLINED. NEW INFORMATION IS UNDERLINED AND DELETED TEXT IS STRUCK OUT.**